WHAT IS CLAIMED IS:

1. A process for the lost pattern casting of metals, said process comprising the steps of:

forming a pattern from a material;

forming an erodable coating around at least a portion of said pattern to form a mold, said coating comprising a particulate material and a binder;

removing said pattern from said mold;

delivering molten metal into said mold;

contacting said mold with a solvent;

cooling said molten metal such that it at least partially solidifies to form a casting; and

removing at least a part of said mold.

2. A process according to claim 1, wherein said material for forming said pattern comprises foam.

3. A process according to claim 1, wherein said step of delivering a molten metal into said mold and said step of removing said pattern from said mold occur approximately simultaneously.

4. A process according to claim 1, further comprising the step of forming an erodable backing around at least a portion of said erodable coating, said erodable backing comprising a particulate material and a binder.

5. A process according to claim 4, further comprising the steps of:

contacting said erodable backing with a solvent; and

removing at least a part of said erodable backing.

6. A process according to claim 4, wherein a weight percent of said binder in said erodable coating is greater than a weight percent of said binder in said erodable backing.

7. A process according to claim 1, wherein said particulate material comprises a material of low heat diffusivity selected from the group consisting of cenospheres; crushed pumice particles; silica sand; ceramic, glass and refractory microbubbles; perlite; and mixtures thereof.

8. A process according to claim 1, wherein said binder comprises a component selected from the group consisting of phosphate glass, inorganic silicates, borates, phosphates, sulfates, organic binders, and mixtures thereof.

9. A process according to claim 1, wherein said step of forming an erodable coating around at least a portion of said pattern to form a mold is performed by dipping said pattern into a slurry comprising said coating.

10. A process according to claim 1, further comprising the step of attaching a gate to said pattern.

11. A process according to claim 10, wherein the step of delivering molten metal into said mold is performed by delivering molten metal through said gate.

12. A process according to claim 1, wherein said binder is free of water and hydrocarbons.

13. A process according to claim 1, wherein said binder is soluble in said solvent.

14. A process according to claim 1, wherein said solvent comprises water.

15. A process according to claim 1, wherein said step of contacting said mold with a solvent comprises the step of spraying the solvent.

16. A process according to claim 1, wherein said mold is permeable to said solvent.

17. A process according to claim 1, wherein said step of contacting said mold with a solvent comprises the step of delivering the solvent to said mold in an amount of from 0.5 to 50 liters per second and at a pressure from 0.03 to 70 bar.

18. A process according to claim 1, wherein said solvent contains at least one of a grit and a surfactant.

19. A process according to claim 1, wherein the steps of removing at least a portion of said mold and cooling the molten metal are performed approximately simultaneously.

20. A process according to claim 1, wherein said step of cooling comprises contacting a shell of solidifying metal around said molten metal with said solvent.

21. A process according to claim 1, wherein said step of cooling comprises the step of using an already cooled portion of the casting as a chill to remove heat from a still molten portion of the casting.

22. A process according to claim 1, wherein said steps of (i) contacting said mold with a solvent; (ii) cooling said molten metal such that it at least partially solidifies to form a casting; and (iii) removing at least a part of said mold; are performed by lowering said mold into a bath of said solvent.

23. An assembly for the lost pattern casting of metals, said assembly comprising a mold, at least a portion of which comprises an erodable aggregate formed from a particulate material and a binder.

24. An assembly according to claim 23, said assembly further comprising an erodable backing at least partially surrounding said mold, wherein said backing comprises an aggregate and a binder.

25. An assembly according to claim 24, wherein a weight percent of binder in said mold is greater than a weight percent of binder in said backing.

26. An assembly according to claim 23, wherein said particulate material comprises a material selected from the group consisting of cenospheres; crushed pumice particles; silica sand; ceramic, glass and refractory microbubbles; perlite; and mixtures thereof.

27. An assembly according to claim 23, wherein said binder is free of water and hydrocarbons.

28. An assembly according to claim 23, wherein said binder is soluble in water.

29. An assembly according to claim 23, wherein said mold is permeable to water.

30. An assembly according to claim 23, further comprising a pattern, wherein said mold is positioned around at least a portion of said pattern.

31. An assembly according to claim 30, further comprising a gate attached to said pattern.

32. An assembly according to claim 30, wherein said pattern comprises polystyrene.

33. An assembly according to claim 23, wherein said binder comprises a component selected from the group consisting of phosphate glass, inorganic silicates, borates, phosphates, sulfates, organic binders, and mixtures thereof.

34. An assembly according to claim 23, further comprising a nozzle for delivering a solvent to contact said mold.

35. An apparatus for the lost pattern casting of metals whereby a lost pattern mold is at least partially eroded and said casting is cooled and solidified by contact with a solvent, said apparatus comprising:

an erodable lost pattern mold;

an erodable backing at least partially surrounding and supporting said mold; and

a nozzle for delivering a solvent to contact at least a part of said mold and said backing.

36. An apparatus according to claim 35, wherein said mold comprises an aggregate and a binder.

37. An apparatus according to claim 35, wherein said backing comprises an aggregate and a binder.

38. An apparatus according to claim 35, wherein said nozzle is configured to deliver said solvent in an amount of from 0.5 to 50 liters per second and at a pressure from 0.03 to 70 bar.

39. An apparatus according to claim 35, comprising a plurality of nozzles.

40. An apparatus according to claim 39, wherein said plurality of nozzles deliver two or more different solvents.

41. An apparatus according to claim 39, wherein said plurality of nozzles deliver solvent at two or more different temperatures, pressures or rates.

42. An apparatus according to claim 35, wherein said nozzle is configured to deliver solvent at a pressure and rate such that a shell of solidifying metal is formed around a metal casting in said mold prior to said solvent contacting said casting.

43. An apparatus according to claim 35, wherein said nozzle is configured to deliver solvent beginning at a base of said mold and progressing to a top of said mold.

44. A process for the lost pattern casting of metals, said process comprising the steps of:

forming a pattern from a material;

forming a coating around at least a portion of said pattern to form a mold;

forming an erodable backing around at least a portion of said mold;

removing said pattern from said mold;

delivering molten metal into said mold;

contacting said erodable backing with a solvent to erode at least a part of said backing;

cooling said molten metal such that it at least partially solidifies to form a casting; and

removing said coating.

45. A process according to claim 44, wherein said steps of (i) contacting said erodable backing with a solvent to erode at least a part of said backing; and (ii) cooling said molten metal such that it at least partially solidifies to form a casting; are performed by lowering said mold into a bath of said solvent.